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(71)出願人 000003207

トヨタ自動車株式会社

愛知県豊田市トヨタ町1番地

(72)発明者 小倉 義次

愛知県豊田市トヨタ町1番地 トヨタ自動
車株式会社内

(74)代理人 100094190

弁理士 小島 清路

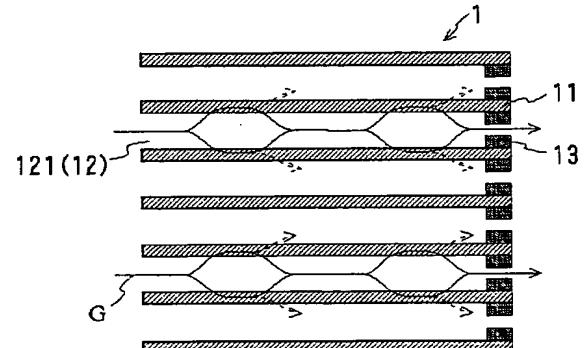
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(54)【発明の名称】 排ガス浄化触媒構造体

(57)【要約】

【課題】 触媒構造体の詰まりが起こりにくく、かつ微粒子成分の浄化率が改善された排ガス浄化触媒構造体を提供する。

【解決手段】 本発明の触媒構造体は、排ガス出口側に絞り部13が設けられた出口絞りセル121を有するモノリス担体1と、モノリス担体1に担持された触媒成分とかなる。出口絞りセル121を形成する隔壁11の気孔率は30~70体積%である。絞り部13により排ガス流れに抵抗を与え、かつ隔壁11が高気孔率なので、排ガスGを隔壁11内に入り込ませて微粒子成分を捕捉し、触媒成分と十分に接触させることができる。モノリス担体1は、出口絞りセル121と交互に、排ガス入口側に絞り部13を有する入口絞りセルあるいは排ガス入口側が閉塞された入口閉塞セルが配置されたものであってもよい。触媒成分としては、酸化触媒またはH C、COおよびNOx浄化触媒が好ましく用いられる。



【特許請求の範囲】

【請求項1】 ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体であって、隔壁により形成された複数のセルを有するモノリス担体と、該モノリス担体に担持された触媒成分とかなりり、

上記隔壁の気孔率は30～70体積%であり、上記複数のセルは、上記モノリス担体を貫通しており排ガス出口側に絞り部が設けられた出口絞りセルを含むことを特徴とする排ガス浄化触媒構造体。

【請求項2】 上記複数のセルは、上記出口絞りセルと、上記モノリス担体を貫通しており排ガス入口側に絞り部が設けられた入口絞りセルとかなりり、該出口絞りセルと該入口絞りセルとは交互に配置されている請求項1記載の排ガス浄化触媒構造体。

【請求項3】 上記複数のセルは、上記出口絞りセルと、排ガス入口側が閉塞された入口閉塞セルとかなりり、該出口絞りセルと該入口閉塞セルとは交互に配置されている請求項1記載の排ガス浄化触媒構造体。

【請求項4】 上記触媒成分として酸化触媒が用いられている請求項1、2または3記載の排ガス浄化触媒構造体。

【請求項5】 上記触媒成分として、HC、COおよびNO_xを浄化する浄化触媒が用いられている請求項1から4のいずれか一項記載の排ガス浄化触媒構造体。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体に関する。

【0002】

【従来の技術】 ディーゼルエンジンの排ガスに含まれる微粒子成分を浄化する方法としては、(1)目封じ型セラミックハニカム等のフィルタを用いて排ガス中の微粒子成分を捕捉し、蓄積した微粒子成分をバーナまたはヒータ等の外部着火手段により燃焼させて上記フィルタを再生する方法と、(2)上記フィルタに触媒物質を担持させ、排ガス中の微粒子成分を捕捉するとともに触媒物質により燃焼も行わせて、バーナまたはヒータを用いた再生の必要をなくす、あるいは再生の頻度を少なくする方法とがある。上記(1)および(2)の方法はいずれも、排ガスがフィルタの隔壁を通り抜ける(ウォールフロー)ときに排ガス中の微粒子成分を捕捉している。

【0003】 また、特開平1-171626号公報には、セラミックハニカム等の三次元構造体に酸化触媒を担持させ、この触媒構造体の貫通孔に排ガスを流しながら(ストレートフロー)、貫通孔周囲の壁面において排ガスと酸化触媒とを接触させることにより、微粒子成分中のSOF(可溶有機成分)を連続的に燃焼させる方法が開示されている。

【0004】

【発明が解決しようとする課題】 しかし、上記(1)の方法によると、外部着火手段を要するため装置が複雑となり、また再生時には微粒子成分が急激に燃焼するためフィルタが損傷しやすい。さらに、供給される排ガス中に含まれる微粒子成分が多いと、フィルタの再生頻度が多くなり経済的に好ましくない。上記(2)の方法によると、再生頻度を少なくすることはできるものの微粒子成分の燃焼制御が難しく、例えば過剰堆積後の急激な燃焼によりフィルタが損傷する場合がある。また、上記(1)および(2)の方法では、微粒子成分の燃焼後に残った灰分(Ash)が次第に蓄積されてフィルタを閉塞するという問題がある。

【0005】 一方、上記特開平1-171626号公報に記載の方法では、排ガスは貫通孔内に流れ隔壁を通り抜けることはないので、灰分による触媒構造体の詰まりや、蓄積された微粒子成分の急激な燃焼による損傷は起こりにくい。しかし、このストレートフロー方式により燃焼浄化可能なのは、微粒子成分中のSOFのみである。微粒子成分中の煤分(Soot)は触媒構造体を素通りするか、せいぜい表面に付着する程度であって、触媒成分の接触が不十分なため燃焼させることができない。したがって、ウォールフロー方式に比べて微粒子成分の浄化率が著しく低いという問題がある。

【0006】 本発明の目的は、触媒構造体の詰まりが起こりにくく、かつ微粒子成分の浄化率が改善された排ガス浄化触媒構造体を提供することにある。

【0007】

【課題を解決するための手段】 上記課題を解決するため30に、請求項1記載の排ガス浄化触媒構造体は、ディーゼルエンジンの排ガスに含まれる微粒子成分の捕捉・燃焼を行う排ガス浄化触媒構造体であって、隔壁により形成された複数のセルを有するモノリス担体と、該モノリス担体に担持された触媒成分とかなりり、上記隔壁の気孔率は30～70体積%であり、上記複数のセルは、上記モノリス担体を貫通しており排ガス出口側に絞り部が設けられた出口絞りセルを含むことを特徴とする。

【0008】 請求項2記載の排ガス浄化触媒構造体は、請求項1記載の構造体において、上記複数のセルは、上記出口絞りセルと、上記モノリス担体を貫通しており排ガス入口側に絞り部が設けられた入口絞りセルとかなりり、該出口絞りセルと該入口絞りセルとは交互に配置されていることを特徴とする。

【0009】 請求項3記載の排ガス浄化触媒構造体は、請求項1記載の構造体において、上記複数のセルは、上記出口絞りセルと、排ガス入口側が閉塞された入口閉塞セルとかなりり、該出口絞りセルと該入口閉塞セルとは交互に配置されていることを特徴とする。

【0010】 請求項4記載の排ガス浄化触媒構造体は、50請求項1、2または3記載の構造体において、上記触媒

成分として酸化触媒が用いられていることを特徴とする。請求項5記載の排ガス浄化触媒構造体は、請求項1から4のいずれか一項記載の構造体において、上記触媒成分として、HC、COおよびNO_xを浄化する浄化触媒が用いられていることを特徴とする。

【0011】本発明の排ガス浄化触媒構造体における「モノリス担体」は、例えば多孔質セラミックス等からなり、隔壁により形成された複数の貫通セルを有する。この隔壁の気孔率は30～70体積%であり、好ましくは40～60体積%、さらに好ましくは45～55体積%である。気孔率が30体積%未満では、本願発明による効果を十分に發揮することができない。一方、気孔率が70体積%を超えるモノリス担体は製造が困難であり、また強度が不足しやすい。

【0012】上記「絞り部」とは、上記貫通セルの流路断面積が他の部分に比べて縮小された部分である。通常この絞り部は、出口絞りセルの場合には貫通セルの出口側端に、入口絞りセルの場合には入口側端に設けることが好ましい。絞り部の形状は特に限定されず、セル横断面における中央に開口部（流路）が形成される形状、1または2以上の角部に開口部が形成される形状等とすることができる。

【0013】出口絞りセルの場合、この絞り部におけるセルの流路断面積の絞り割合は、他の部分の流路断面積を100%として、開口部（流路）の面積の合計が30～90%であることが好ましく、より好ましくは40～80%、さらに好ましくは50～75%である。また、この絞り部におけるセルの流路断面積は、例えば隔壁厚さ0.3mm、セル数300個/in²の場合において、0.3～1.2mm²とすることができる、好ましくは0.4～1.0mm²とすることができる。絞り部の長さは、例えば3～10mmであり、好ましくは3～5mmである。絞りの程度が大きすぎると、微粒子成分あるいはその灰分によりこの絞り部において出口絞りセルが詰まりやすくなる。また、圧力損失が増大して内燃機関の性能が実質的に低下するため好ましくない。一方、絞りの程度が小さすぎると、排ガスを隔壁内に入り込ませる効果が不足し、微粒子成分の浄化性能が低下する。

【0014】上記モノリス担体に担持させる「触媒成分」は、微粒子を着火燃焼させるためのものであって、請求項4記載のように酸化触媒を用いることが好ましい。酸化触媒としては、例えば白金族金属から選択される一種または二種以上を用いることができる。これにより、触媒構造体の入口における排ガス温度が例えば400°C程度の低温であっても、外部着火手段を用いることなく微粒子成分を捕捉燃焼させることができる。また、請求項5記載のように、この触媒成分としてHC、COおよびNO_xを浄化する浄化触媒（例えばNO_x吸蔵還元触媒）を用いる場合には、この排ガス触媒構造体がHC、CO、NO_xおよび微粒子（バティキュレート）を

除去する四元触媒として機能するものとなるため好ましい。

【0015】上記触媒成分は、通常はモノリス担体の全体にわたって隔壁の表裏両面に担持され、その担持量はモノリス担体の各部においてほぼ均一であることが好ましい。触媒成分の担持量は特に限定されないが、例えば1～10g/リットルとすることができる。

【0016】（作用および効果）本発明の排ガス浄化触媒構造体は、従来のウォールフロー型の排ガス浄化フィルタに用いられる目封じ型セラミックハニカム等とは異なり、貫通したセルを有するので、このセルが微粒子成分やその灰分により閉塞されにくい。また、従来のストレートフロー型の触媒構造体に比べて隔壁の気孔率が高く、かつ出口側に設けられた絞り部により排ガス流に抵抗を与えていたため、排ガスの一部が隔壁を通り抜けるか、あるいは隔壁表面より内側に入り込みやすい（半ウォールフロー）。したがって、微粒子成分の少なくとも一部を隔壁により捕捉し、この微粒子成分を触媒成分と十分に接触させて、SO₂のみならず煤まで燃焼させて浄化することができる。なお、従来のストレートフロー型触媒構造体では、隔壁表面よりも内側に排ガスを取り込ませる意図がなかったため気孔率を高くする動機がなく、構造体の強度および製造の容易性から隔壁の気孔率は通常15～25体積%程度であった。

【0017】請求項2記載のように、出口絞りセルと入口絞りセルとが交互に配置された構造とした場合には、入口絞りセル内が負圧となることにより、出口絞りセル内の排ガスが隔壁を通り抜けて入口絞りセル内へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。また、請求項3記載のように、出口絞りセルと入口閉塞セルとが交互に配置された構造とした場合には、出口絞りセル内に比べて入口閉塞セル内の圧力は低いので、出口絞りセル内の排ガスが隔壁を通り抜けて入口絞りセル内へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。

【0018】

【発明の実施の形態】以下、実施例により本発明を更に具体的に説明する。

（実施例1）気孔率50%のコーチェライト製ハニカム状体（容量1.3リットル、隔壁厚さ0.3mm、セル数300個/in²）を準備した。このハニカム状体の出口側端面部約5mmを別途調整したコーチェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥して焼成した。得られたモノリス担体は、セル断面（排ガス流路）の一辺が1.2mmの正方形であり、その出口側約5mmにおいて排ガス流路が一辺約0.9mmの正方形に絞り込まれた形状の出口絞りセルからなる。その後、このモノリス担体に活性アルミナを主体とするウォッシュコート層を形成し、ここに酸化触媒として2g/リットル（触媒構造体1リット

ル当たり2g)のPtを担持させた。

【0019】この排ガス浄化触媒構造体の断面図を図1に示す。モノリス担体1は、厚さ0.3mm、気孔率50%の隔壁11により形成された複数のセル12を有する。この実施例1では、セル12はいずれも、モノリス担体1を貫通しており排ガス出口側(図1の右側)に絞り部13が設けられた出口絞りセル121である。出口絞りセル121の排ガス入口側(図1の左側)は絞られていない。なお、図1～図5ではウォッシュコート層および触媒成分を省略して示している。

【0020】(実施例2)実施例2の排ガス浄化触媒構造体の断面図を図2に示す。このモノリス担体1におけるセル12は、排ガス出口側に絞り部13が設けられた出口絞りセル121と、排ガス入口側に絞り部13が設けられた入口絞りセル122とからなる。出口絞りセル121と入口絞りセル122とは交互に配置されている。出口絞りセル121の出口側端および入口絞りセル122の入口側端に設けられた絞り部13の長さは5mmであり、開口部の形状は0.9mm²の正方形状である。出口絞りセル121の入口側端および入口絞りセル122の出口側端は絞られていない。その他の構成および絞り部13の形成方法は実施例1と同様である。

【0021】(実施例3)実施例3の排ガス浄化触媒構造体の断面図を図3に示す。このモノリス担体1におけるセル12は、排ガス出口側に実施例1と同形状の絞り部13が設けられた出口絞りセル121と、排ガス入口側が栓14により閉塞された入口閉塞セル123とからなる。出口絞りセル121と入口閉塞セル123とは交互に配置されている。出口絞りセル121の入口側端および入口閉塞セル123の出口側端は絞られていない。その他の構成および絞り部13の形成方法は実施例1と同様である。

【0022】(実施例4)実施例1と同じハニカム構造体を用いて、コーチェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥する工程を二回繰り返した後に焼成した点以外は実施例1と同様にしてモノリス担体1を得た。このモノリス担体1は*

*出口絞りセル121のみからなり、そのセル断面の一辺は1.2mmの正方形状であり、出口側約5mmにおいて排ガス流路が一辺約0.5mmの正方形状に絞り込まれている。その他の構成は実施例1と同様である。

【0023】(比較例1)比較例1の排ガス浄化触媒構造体の断面図を図4に示す。この構造体におけるモノリス担体1は、絞り部を形成しない点以外は実施例1と同様にして得られたものであって、絞り部をもたないストレートセル124のみからなる。その他の構成は実施例1と同様である。

【0024】(比較例2)比較例2の排ガス浄化触媒構造体の断面図を図5に示す。この構造体におけるモノリス担体1は、気孔率20%のコーチェライト製ハニカム状体(容量1.3リットル、隔壁厚さ0.15mm、セル数400個/in²)を用い、コーチェライト粉末のスラリーに浸漬し、引き上げて余分なスラリーを軽く吹き払い、乾燥する工程を二回繰り返した後に焼成した点以外は実施例1と同様にして得られたものである。このモノリス担体1は出口絞りセル121のみからなり、そのセル断面の一辺は1.2mmの正方形状であり、出口側約5mmにおいて排ガス流路が一辺約0.5mmの正方形状に絞り込まれている。その他の構成は実施例1と同様である。

【0025】(評価)実施例1～4および比較例1、2の排ガス浄化触媒構造体を排気量2000ccのディーゼルエンジンの排気系に取り付け、2000rpm、触媒構造体の入口における排ガス温度400°Cの条件で2時間運転した。運転開始から1時間後および2時間後の時点で、浄化後の排ガスにおける微粒子成分低減率(浄化率)と、触媒構造体に付着した微粒子成分の量とを測定した。なお、燃料としては硫黄分10ppm以下の低硫黄軽油を用いたため、硫黄化合物生成による微粒子低減率悪化は無視できると考えられる。試験結果を表1に示す。

【0026】

【表1】

表 1

	微粒子成分 低減率(%)		微粒子成分付着量 (g/セル数)
	1時間後	2時間後	
実施例1	24	21	0.4
実施例2	42	40	0.2
実施例3	55	51	0.2
実施例4	28	27	0.3
比較例1	8	6	0.6
比較例2	9	5	0.5

【0027】表1から判るように、絞り部をもたないストレートフロー型の触媒構造体を用いた比較例1、およ

び隔壁の気孔率が低いモノリス担体を用いた比較例2に対して、実施例1～4の触媒構造体では、いずれも微粒

子成分の低減率が明らかに向上した。これは、排ガスの一部が隔壁の表面よりも内側に入り込み、この隔壁により微粒子成分が濾過捕集されたためと考えられる。また、このように微粒子成分を隔壁で積極的に捕集しているにもかかわらず、試験後の触媒構造体に付着していた微粒子成分の量は、むしろ実施例のほうが多い傾向にあった。これは、捕集された微粒子成分が効率的に触媒成分（ここではPt）と反応して燃焼浄化されているためと推定される。

【0028】なお、構成および上記評価結果から推察される、実施例1～4および比較例1、2の排ガス浄化構造体における排ガスGの流れを図1～5にそれぞれ示す。実施例1および4の構造体では、図示しないディーゼルエンジンからの排ガスGは、図1の左側から出口絞りセル121に流入する。絞り部13により流れがやや妨げられており、また隔壁11の気孔率が高いことにより、排ガスGの一部は隔壁11の内部まで進入し、さらに隔壁11を通り抜けて隣接する出口絞りセル121に流入する場合もある。これにより、隔壁11の表面で微粒子成分を捕捉し、担持された触媒成分と十分に接触させることができる。

【0029】実施例2の構造体では、下流側に排ガスGの流れに対する抵抗を設けた出口絞りセル121と、下流側が開放された入口絞りセル122とが交互に配置されている。さらに、図2の左端から絞り部13を通って入口絞りセル122に流入した排ガスGが膨張することにより入口絞りセル内122が負圧となる。このため、出口絞りセル121内に比べて入口絞りセル122内は低圧となり、出口絞りセル121内の排ガスGが隔壁11を通り抜けて入口絞りセル内122へと導入されやすい。したがって、微粒子成分の捕捉・燃焼効率が良好である。

【0030】実施例3の構造体では、下流側に排ガスGの流れに対する抵抗を設けた出口絞りセル121と、入口側が閉塞され下流側が開放された入口絞りセル122とが交互に配置されている。出口絞りセル121内に比べて入口絞りセル122内は低圧となるので、出口絞り*

*セル121内の排ガスGが隔壁11を通り抜けて入口絞りセル内122へと導入されやすく、微粒子成分の捕捉・燃焼効率が良い。そして、実施例1～4の構造体において、出口絞りセル121は下流側が絞られながらも貫通しているので、排ガスG中の微粒子成分やその灰分により閉塞されにくい。

【0031】これに対して、比較例1の構造体は絞り部をもたないため、排ガスGがストレートセル124を素通りしてしまい、排ガスGと触媒成分とを十分に接触させることができなかったものと考えられる。また、比較例2の構造体は出口絞りセル121を有するが、隔壁11の気孔率が20%と低いため、排ガスGを隔壁11内に入り込ませることができず、排ガスGと触媒成分とを十分に接触させることができなかったものと考えられる。

【図面の簡単な説明】

【図1】実施例1の排ガス浄化触媒構造体を示す断面図である。

【図2】実施例2の排ガス浄化触媒構造体を示す断面図である。

【図3】実施例3の排ガス浄化触媒構造体を示す断面図である。

【図4】比較例1の排ガス浄化触媒構造体を示す断面図である。

【図5】比較例2の排ガス浄化触媒構造体を示す断面図である。

【符号の説明】

1：モノリス担体

11：隔壁

12：セル

121：出口絞りセル

122：入口絞りセル

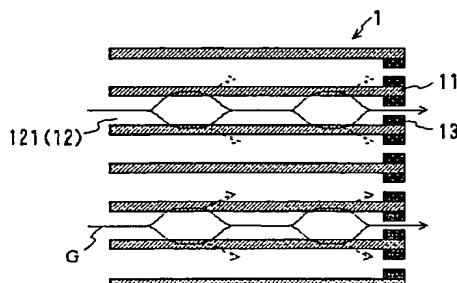
123：入口閉塞セル

124：ストレートセル

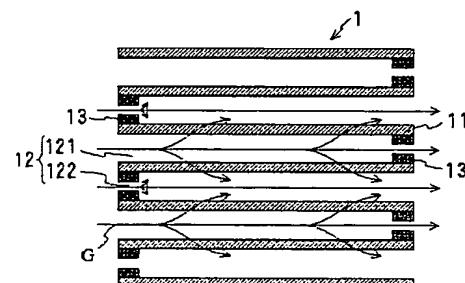
13：絞り部

G：排ガス

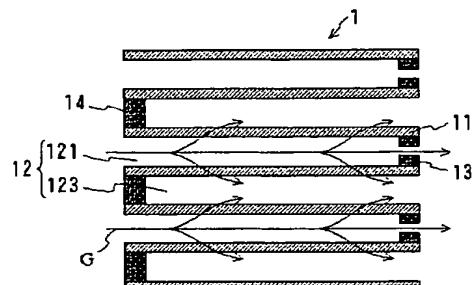
【図1】



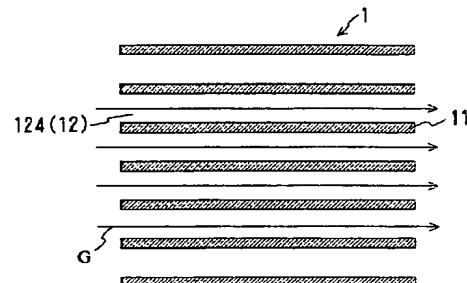
【図2】



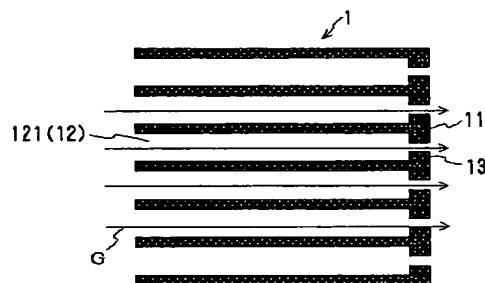
【図3】



【図4】



【図5】



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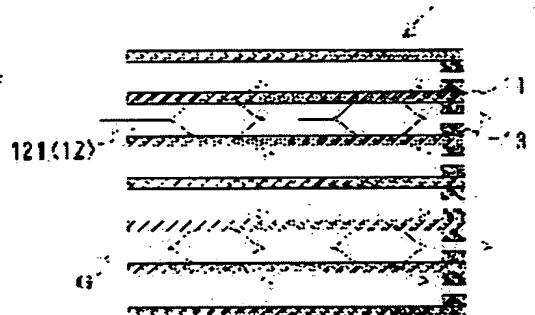
(22)Date of filing : 17.10.2000 (72)Inventor : OGURA YOSHITSUGU

(54) CATALYTIC STRUCTURAL BODY FOR PURIFYING WASTE GAS

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a catalytic structural body for purifying waste gas that hardly causes clogging of itself and that improves purifying ratio of a fine particle component.

SOLUTION: The catalytic structural body is composed of a monolith carrier 1 having an outlet throttle cell 121 provided with a throttle part 13 at the outlet side of a waste gas and a catalytic component carried on the monolith carrier 1. The porosity of a partition wall 11 forming the outlet throttle cell 121 is 30-70 vol.%. The fine particle component is collected and brought into sufficient contact with the catalytic component by giving the resistance to the flow of the waste gas by the throttle part 13 to infiltrate the waste gas G into the partition wall 11 having high porosity. The monolith carrier 1 can be provided with an inlet throttle cell or an inlet closing cell having the throttle part 13 arranged at the waste gas inlet side alternately with the outlet throttle cell 121. As the catalytic component, an oxidation catalyst or a catalyst for purifying HC, CO and NOx is preferably used.



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CLAIMS

[Claim(s)]

[Claim 1] The exhaust gas purification catalyst structure which performs prehesion and combustion of the particle component contained in the exhaust gas of a diesel power plant characterized by providing the following Monolith support which has two or more cells formed of the septum It consists of a catalyst component supported by this monolith support, the porosity of the above-mentioned septum is 30 to 70 volume %, two or more above-mentioned cells have penetrated the above-mentioned monolith support, and it is a converging section to an exhaust gas outlet side.

[Claim 2] Two or more above-mentioned cells are the exhaust gas purification catalyst structure according to claim 1 which consists of an entrance drawing cell in which the above-mentioned outlet drawing cell and the above-mentioned monolith support were penetrated, and the converging section was formed in the exhaust gas entrance side and by which this outlet drawing cell and this entrance drawing cell are arranged by turns.

[Claim 3] Two or more above-mentioned cells are the exhaust gas purification catalyst structure according to claim 1 which consists of an entrance lock out cell by which the above-mentioned outlet drawing cell and the exhaust gas entrance side were blockaded and by which this outlet drawing cell and this entrance lock out cell are arranged by turns.

[Claim 4] The exhaust gas purification catalyst structure according to claim 1, 2, or 3 for which the oxidation catalyst is used as the above-mentioned catalyst component.

[Claim 5] The exhaust gas purification catalyst structure of four given in any 1 term from the claim 1 for which the purification catalyst which purifies HC, CO, and NOx is used as the above-mentioned catalyst component.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the exhaust gas purification catalyst structure which performs prehesion and combustion of the particle component contained in the exhaust gas of a diesel power plant.

[0002]

[Description of the Prior Art] As a method of purifying the particle component contained in the exhaust gas of a diesel power plant (-- the 1st) -- a **** type -- with the method of burning the particle component which caught and accumulated the particle component in exhaust gas using filters, such as a ceramic honeycomb, by external ignition means, such as a burner or a heater, and reproducing the above-mentioned filter (2) Make the above-mentioned filter support the catalyst matter, while catching the particle component in exhaust gas, the catalyst matter is made to also perform combustion, and there is the method of abolishing the need for the reproduction using the burner or the heater, or lessening reproductive frequency. Each of above (1) and methods of (2) has caught the particle component in exhaust gas, when exhaust gas passes through the septum of a filter (wall flow).

[0003] Moreover, the method of burning continuously SOF in a particle component (meltable organic component) is indicated by JP,1-171626,A by contacting exhaust gas and an oxidation catalyst in the wall surface of the circumference of a breakthrough, making three-dimensional structure objects, such as a ceramic honeycomb, support an oxidation catalyst, and passing exhaust gas to the breakthrough of this catalyst structure (straight flow).

[0004]

[Problem(s) to be Solved by the Invention] However, according to the method of the above (1), since equipment becomes complicated in order to require an external ignition means, and a particle component burns rapidly at the time of reproduction, it is easy to damage a filter. Furthermore, if there are many particle components contained in the exhaust gas supplied, the reproduction frequency of a filter increases and it is not economically desirable. According to the method of the above (2), a filter may be damaged by rapid combustion after superfluous deposition difficultly [the combustion control of the particle component of what can lessen reproduction frequency]. Moreover, by the above (1) and the method of (2), there is a problem that the ash content (Ash) which remained after combustion of a particle component is accumulated gradually, and blockades a filter.

[0005] On the other hand, by the method given in above-mentioned JP,1-171626,A, since exhaust gas is passed in a breakthrough and does not pass through a septum, the injury by plugging of the catalyst structure by ash content and rapid combustion of the accumulated particle component cannot take place easily. However, combustion purification with this straight flow method is possible only for SOF in a particle component. The amount of [in a particle component] (Soot) soot is a grade which bypasses the catalyst structure or adheres to a front face at most, and contact of a catalyst component cannot inadequate hatchet burn it. Therefore, compared with a wall flow method, the rate of purification of a particle component is remarkable, and there is a problem of a low.

[0006] The purpose of this invention is to offer the exhaust gas purification catalyst structure by which plugging of the catalyst structure could not happen easily and the rate of purification of a particle component has been improved.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the exhaust gas purification catalyst structure according to claim 1 The monolith support which is the exhaust gas purification catalyst structure which performs prehesion and combustion of the particle component contained in the exhaust gas of a diesel power plant, and has two or more cells formed of the septum, It is characterized by including the outlet drawing cell in which it consisted of a catalyst component supported by this monolith support, and the porosity of the above-mentioned septum is 30 to 70 volume %, two or more above-mentioned cells had penetrated the above-mentioned monolith support, and the converging section was formed in the exhaust gas outlet side.

[0008] Two or more above-mentioned cells are characterized by for the exhaust gas purification catalyst structure according to claim 2 having penetrated the above-mentioned outlet drawing cell and the above-mentioned monolith support in the structure according to claim 1, and becoming an exhaust gas entrance side from the entrance drawing cell in which the converging section was formed, and arranging this outlet drawing cell and this entrance drawing cell by turns.

[0009] As for the exhaust gas purification catalyst structure according to claim 3, in the structure according to claim 1, two or more above-mentioned cells consist of an entrance lock out cell by which the above-mentioned outlet drawing cell and the exhaust gas entrance side were blockaded, and it is characterized by arranging this outlet drawing cell and this entrance lock out cell by turns.

[0010] The exhaust gas purification catalyst structure according to claim 4. In the structure according to claim 1, 2, or 3, it is characterized by using the oxidation catalyst as the above-mentioned catalyst component. The exhaust gas purification catalyst structure according to claim 5. It is characterized by using the purification catalyst which purifies HC, CO, and NOx as the above-mentioned catalyst component in the structure of four given in any 1 term from a claim 1.

[0011] The "monolith support" in the exhaust gas purification catalyst structure of this invention consists for example, of porosity ceramics etc., and it has two or more penetration cells formed of the septum. The porosity of this septum is 30 to 70 volume %, and is 45 to 55 volume % preferably [it is desirable and] to 40 to 60 volume %, and a pan. Porosity cannot fully demonstrate the effect by the invention in this application under by 30 volume %. On the other hand, the monolith support to which porosity exceeds 70 volume % is difficult to manufacture, and tends to run short of intensity.

[0012] It is the portion by which the passage cross section of the above-mentioned penetration cell was reduced to other portions compared with the above "a converging section." Usually, it is desirable to form this converging section in the outlet side edge of a penetration cell in the case of an outlet drawing cell, and to form it in an entrance-side edge in the case of an entrance drawing cell. Especially the configuration of a converging section is not limited but can be made into the configuration by which opening is formed in the configuration, 1, or two or more corners by which opening (passage) is formed in the center in the cell cross section.

[0013] In the case of an outlet drawing cell, the drawing rate of the passage cross section of the cell in this converging section makes the passage cross section of other portions 100%, it is desirable that the sum total of the area of opening (passage) is 30 - 90%, and it is 50 - 75% still more preferably 40 to 80% more preferably. Moreover, in the case of 2, the passage cross section of the cell in this converging section can be set to 2 0.3-1.2mm 0.3mm in septum thickness, and 300 cell numbers/inch, and can be preferably set to 2 0.4-1.0mm. The length of a converging section is 3-10mm, and is 3-5mm preferably. If the grade of drawing is too large, in this converging section, it will become easy to get an outlet drawing cell blocked by the particle component or its ash content. Moreover, since pressure loss increases and the performance of an internal combustion engine falls substantially, it is not desirable. On the other hand, if the grade of drawing is too small, the effects of making exhaust gas entering in a septum will run short, and the purification performance of a particle component will fall.

[0014] The "catalyst component" which the above-mentioned monolith support is made to support is for

carrying out ignition combustion of the particle, and its thing [using an oxidation catalyst like] according to claim 4 is desirable. As an oxidation catalyst, a kind chosen from a platinum metal, for example or two sorts or more can be used. Thereby, even if the exhaust gas temperature in the entrance of the catalyst structure is the low temperature which is about 400 degrees C, prehension combustion of the particle component can be carried out, without using an external ignition means. Moreover, since this exhaust gas catalyst structure becomes what functions as a 4 yuan catalyst which removes HC, CO, NOx, and a particle (particulate) in using the purification catalyst (for example, NOx occlusion reduction catalyst) according to claim 5 which purifies HC, CO, and NOx as this catalyst component like, it is desirable.

[0015] The above-mentioned catalyst component is usually supported by front reverse side both sides of a septum over the whole monolith support, and the amount of support has an almost uniform desirable thing in each part of monolith support. Especially the amount of support of a catalyst component can be carried out, for example in 1-10g/l., although not limited.

[0016] (An operation and effect) Since the exhaust gas purification catalyst structures of this invention differ in the ***** type ceramic honeycomb used for a conventional wall flow type exhaust gas purification filter and have the penetrated cell, this cell can be easily blockaded by neither a particle component nor its ash content. Moreover, since resistance is given to the emission with the converging section which the porosity of a septum was high and was formed in the outlet side compared with the conventional straight flow type catalyst structure, a part of exhaust gas passes through a septum, or it is easy to enter inside a septum front face (half-wall flow). Therefore, a part of particle component [at least] is caught by the septum, a catalyst component is made to fully contact, not only SOF but soot is burned, and this particle component can be purified. In addition, in the conventional straight flow type catalyst structure, since there was no intention into which exhaust gas is made to enter inside a septum front face, there was no motive to make porosity high, and the intensity of the structure and the porosity of the ease of manufacture to a septum were usually 15 - 25 volume % grades.

[0017] The exhaust gas in an outlet drawing cell passes through a septum, and it is tended into an entrance drawing cell to introduce the inside of an entrance drawing cell negative pressure and a bird clapper, when it considers as the structure according to claim 2 where the outlet drawing cell and the entrance drawing cell have been arranged by turns, like. Therefore, prehension and combustion efficiency of a particle component are good. Moreover, when it considers as the structure according to claim 3 where the outlet drawing cell and the entrance lock out cell have been arranged by turns, like, compared with the inside of an outlet drawing cell, the exhaust gas in an outlet drawing cell passes through a septum, and it is easy for the pressure in an entrance lock out cell to be a low, and to be introduced into an entrance drawing cell. Therefore, prehension and combustion efficiency of a particle component are good.

[0018]

[Embodiments of the Invention] Hereafter, an example explains this invention still more concretely. (Example 1) The honeycomb-like object made from a cordierite of 50% of porosity (0.3mm in the capacity of 1.3l. and septum thickness, the number of cells 300 pieces/inch²) was prepared. It was immersed in the slurry of the cordierite powder adjusted separately, 5mm of outlet side end-face **** of this honeycomb-like object was pulled up, the excessive slurry was blown off lightly, and it dried and calcinated. One side of a cell cross section (exhaust gas passage) has the shape of a square which is 1.2mm, and the obtained monolith support consists of an outlet drawing cell of the configuration to which exhaust gas passage was narrowed down in the shape of [one-side / it is / in the shape of / about 0.9mm] a square in about 5mm of the outlet side. Then, the wash coat layer which makes an activated alumina a subject was formed in this monolith support, and 2g [/l.] (2g per 1l. of catalyst structures) Pt was made to support here as an oxidation catalyst.

[0019] The cross section of this exhaust gas purification catalyst structure is shown in drawing 1. The monolith support 1 has two or more cells 12 formed of the septum 11 of 0.3mm in thickness, and 50% of porosity. In this example 1, a cell 12 is the outlet drawing cell 121 in which the monolith support 1 was penetrated and the converging section 13 was formed in the exhaust gas outlet side (right-hand side

of drawing 1) by each. The exhaust gas entrance side (left-hand side of drawing 1) of the outlet drawing cell 121 is not extracted. In addition, drawing 1 - drawing 5 omit and show the wash coat layer and the catalyst component.

[0020] (Example 2) The cross section of the exhaust gas purification catalyst structure of an example 2 is shown in drawing 2 . The cell 12 in this monolith support 1 consists of an outlet drawing cell 121 in which the converging section 13 was formed in the exhaust gas outlet side, and an entrance drawing cell 122 in which the converging section 13 was formed in the exhaust gas entrance side. The outlet drawing cell 121 and the entrance drawing cell 122 are arranged by turns. The length of the converging section 13 formed in the outlet side edge of the outlet drawing cell 121 and the entrance-side edge of the entrance drawing cell 122 is 5mm, and the configuration of opening has the shape of a square of 2 0.9mm. The entrance-side edge of the outlet drawing cell 121 and the outlet side edge of the entrance drawing cell 122 are not extracted. Other composition and the formation method of a converging section 13 are the same as that of an example 1.

[0021] (Example 3) The cross section of the exhaust gas purification catalyst structure of an example 3 is shown in drawing 3 . The cell 12 in this monolith support 1 consists of an outlet drawing cell 121 in which the converging section 13 of the shape of an example 1 and isomorphism was formed in the exhaust gas outlet side, and an entrance lock out cell 123 by which the exhaust gas entrance side was blockaded with the plug 14. The outlet drawing cell 121 and the entrance lock out cell 123 are arranged by turns. The entrance-side edge of the outlet drawing cell 121 and the outlet side edge of the entrance lock out cell 123 are not extracted. Other composition and the formation method of a converging section 13 are the same as that of an example 1.

[0022] (Example 4) Using the same honeycomb-structure object as an example 1, it was immersed in the slurry of cordierite powder and the monolith support 1 was obtained like the example 1 except the point calcinated after having pulled up, blowing off the excessive slurry lightly and repeating the process to dry twice. This monolith support 1 consists only of an outlet drawing cell 121, one side of the cell cross section has the shape of a 1.2mm square, and exhaust gas passage is narrowed down in about 5mm of outlet sides in the shape of [one side / it is / in the shape of / about 0.5mm] a square. Other composition is the same as that of an example 1.

[0023] (Example 1 of comparison) The cross section of the exhaust gas purification catalyst structure of the example 1 of comparison is shown in drawing 4 . Except the point which does not form a converging section, the monolith support 1 in this structure is obtained like an example 1, and consists only of a straight cell 124 without a converging section. Other composition is the same as that of an example 1.

[0024] (Example 2 of comparison) The cross section of the exhaust gas purification catalyst structure of the example 2 of comparison is shown in drawing 5 . Using the honeycomb-like object made from a cordierite of 20% of porosity (0.15mm in the capacity of 1.31., and septum thickness, the number of cells 400 pieces/inch²), the monolith support 1 in this structure is immersed in the slurry of cordierite powder, and is obtained like an example 1 except the point calcinated after having pulled up, blowing off the excessive slurry lightly and repeating the process to dry twice. This monolith support 1 consists only of an outlet drawing cell 121, one side of the cell cross section has the shape of a 1.2mm square, and exhaust gas passage is narrowed down in about 5mm of outlet sides in the shape of [one side / it is / in the shape of / about 0.5mm] a square. Other composition is the same as that of an example 1.

[0025] (Evaluation) The exhaust gas purification catalyst structure of examples 1-4 and the examples 1 and 2 of comparison was attached in the exhaust air system of a diesel power plant with a displacement of 2000 cc, and it operated for 2 hours on conditions with an exhaust gas temperature [in the entrance of 2000rpm and the catalyst structure] of 400 degrees C. At the time after (1 hour and 2 hours) a start up, the rate of particle component reduction in the exhaust gas after purification (rate of purification) and the amount of the particle component adhering to the catalyst structure were measured. In addition, since low-sulfur gas oil of 10 ppm or less of sulfur contents was used as fuel, it is thought that the rate aggravation of particle reduction by sulfur-compound generation can be disregarded. A test result is shown in Table 1.

[0026]

[Table 1]

表 1

	微粒子成分 低減率 (%)		微粒子成分付着量 (g / セル数)
	1 時間後	2 時間後	
実施例 1	2 4	2 1	0. 4
実施例 2	4 2	4 0	0. 2
実施例 3	5 5	5 1	0. 2
実施例 4	2 8	2 7	0. 3
比較例 1	8	6	0. 6
比較例 2	9	5	0. 5

[0027] As shown in Table 1, by the catalyst structure of examples 1-4, the rate of reduction of a particle component all improved clearly to the example 1 of comparison using the straight flow type catalyst structure without a converging section, and the example 2 of the comparison using low monolith support of the porosity of a septum. A part of exhaust gas enters inside the front face of a septum, and this is considered because the filtration uptake of the particle component was carried out by this septum.

Moreover, in spite of having carried out the uptake of the particle component positively by the septum in this way, the amount of the particle component adhering to the catalyst structure after an examination suited the inclination with few examples rather. This is presumed because the particle component by which the uptake was carried out reacts with a catalyst component (here Pt) efficiently and combustion purification is carried out.

[0028] In addition, the flow of exhaust gas G in the exhaust gas purification structure of the examples 1-4 and the examples 1 and 2 of comparison which are guessed from composition and the above-mentioned evaluation result is shown in drawing 1 -5, respectively. In the structure of examples 1 and 4, exhaust gas G from the diesel power plant which is not illustrated flows into the outlet drawing cell 121 from the left-hand side of drawing 1 . The flow is barred a little by the converging section 13, and according to the porosity of a septum 11 being high, a part of exhaust gas G may advance to the interior of a septum 11, and it may flow into the outlet drawing cell 121 which passes through a septum 11 further and adjoins. Thereby, a particle component can be caught on the front face of a septum 11, and the supported catalyst component can be made to fully contact.

[0029] In the structure of an example 2, the outlet drawing cell 121 which prepared the resistance to the flow of exhaust gas G in the downstream, and the entrance drawing cell 122 in which the downstream was opened wide are arranged by turns. Furthermore, when exhaust gas G which flowed into the entrance drawing cell 122 through the converging section 13 from the left end of drawing 2 expands, 122 in an entrance drawing cell becomes negative pressure. For this reason, compared with the inside of the outlet drawing cell 121, the inside of the entrance drawing cell 122 serves as low voltage, and exhaust gas G in the outlet drawing cell 121 passes through a septum 11, and it is easy to be introduced 122 in an entrance drawing cell. Therefore, prehesion and combustion efficiency of a particle component are good.

[0030] In the structure of an example 3, the outlet drawing cell 121 which prepared the resistance to the flow of exhaust gas G in the downstream, and the entrance drawing cell 122 in which the entrance side was blockaded and the downstream was opened wide are arranged by turns. Since the inside of the entrance drawing cell 122 serves as low voltage compared with the inside of the outlet drawing cell 121, exhaust gas G in the outlet drawing cell 121 passes through a septum 11, it is easy to be introduced 122 in an entrance drawing cell, and prehesion and combustion efficiency of a particle component are good. And in the structure of examples 1-4, since the downstream has penetrated the outlet drawing cell 121 despite a rat tail, the particle component in exhaust gas G and its ash content are hard to be blockaded.

[0031] On the other hand, since the structure of the example 1 of comparison does not have a converging section, exhaust gas G bypasses the straight cell 124, and it is considered that it was not fully

able to contact exhaust gas G and a catalyst component. Moreover, although the structure of the example 2 of comparison has the outlet drawing cell 121, for a 20% and low reason, the porosity of a septum 11 cannot make exhaust gas G enter in a septum 11, but is considered that it was not fully able to contact exhaust gas G and a catalyst component.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross section showing the exhaust gas purification catalyst structure of an example 1.

[Drawing 2] It is the cross section showing the exhaust gas purification catalyst structure of an example 2.

[Drawing 3] It is the cross section showing the exhaust gas purification catalyst structure of an example 3.

[Drawing 4] It is the cross section showing the exhaust gas purification catalyst structure of the example 1 of comparison.

[Drawing 5] It is the cross section showing the exhaust gas purification catalyst structure of the example 2 of comparison.

[Description of Notations]

1; monolith support

11; septum

12; cell

121; outlet drawing cell

122; entrance drawing cell

123; entrance lock out cell

124; straight cell

13; converging section

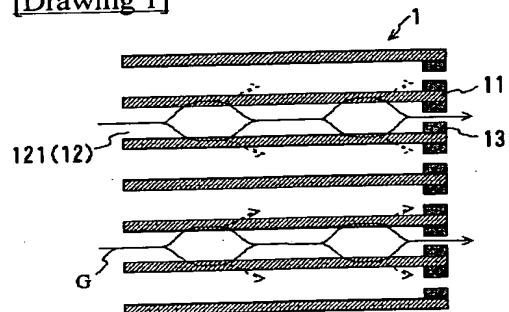
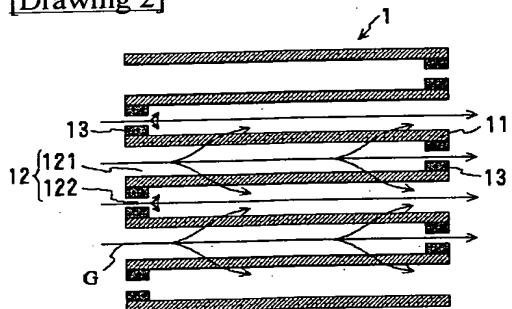
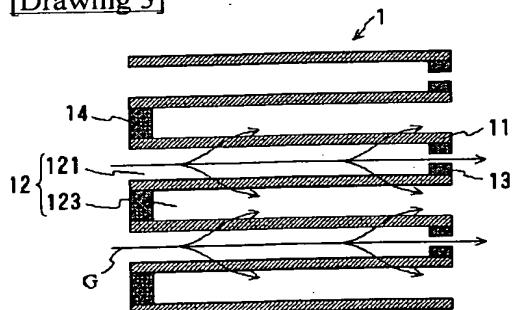
G; exhaust gas

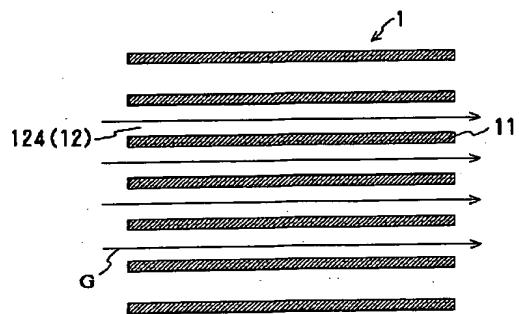
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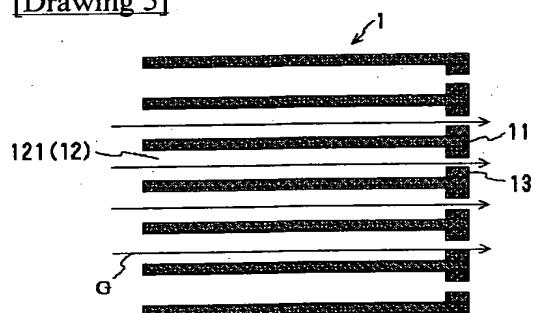
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DRAWINGS**[Drawing 1]****[Drawing 2]****[Drawing 3]****[Drawing 4]**



[Drawing 5]



[Translation done.]